

REMARKS

Claims 9, 10, 12, 13, 15, 16 and 22-31 are pending. By this Amendment, no claims are cancelled, no claims are amended, no new claims are added, and amendment to the specification is made to add subheadings to the Background of the Invention section.

**Amendment to the Specification**

MPEP §2163.07 states that “amendments to an application which are supported by the original description are NOT new matter.” The present application is a national stage application under 35 U.S.C. 371 of international application PCT/GB03/04646 filed October 28, 2003, which claims foreign application priority data to United Kingdom application 0225518.0 filed November 1, 2002. The international application did not have the “Background of the Invention” section, but instead was added as suggested by 37 CFR 1.77. As indicated in MPEP §608.01(c), the Background of the Invention ordinarily comprises two parts: (1) Field of the Invention, and (2) Description of the Related Art. Applicants have amended the specification to clearly differentiate between these two parts of the Background of the Invention section. Particularly, the Field of the Invention part is “[a] statement of the field of art which the invention pertains...The statement should be directed to the subject matter of the claimed invention.” Id. (emphasis added.) In other words, the Field of the Invention part is not admitted prior art by the Applicants. In contrast, the Description of the Related Art part may indicate “the problems involved in the prior art or other information disclosed which are solved by the applicant’s invention.” Id.

Page 1, lines 1-5 in Applicants’ original description clearly pertain to the Field of the Invention, not a Description of the Related Art, as the description specifically states:

The present invention relates to welding two metal work-pieces together and relates in particular, but not exclusively, to welding together two relatively thick work-pieces made from metal alloys that have been prepared for use in the manufacture of aircraft components.

The Office Action mailed September 22, 2009 characterizes Applicant's Admitted Prior Art (AAPA) as relating to Applicants' Specification at page 1, lines 1-21. To the extent Applicant's Field of the Invention section (page 1, lines 1-5) is characterized as AAPA, such characterization is improper at least under MPEP 608.01(c), not to mention the clear language used in the foregoing statement. Moreover, the foregoing statement does not constitute an admission by Applicants as there is no indication that the foregoing statement is the "work of another" as required in order to be AAPA. See MPEP 2129 (I). In fact, it is quite clear that the foregoing statement refers to Applicants' "present invention" and not the work of another.

Therefore, the foregoing amendment is proper to clarify the scope of what is asserted to be AAPA in Applicants' specification, especially as it applies the Office Action mailed September 22, 2009. Entry of the foregoing amendment to the specification is respectfully requested.

#### **Status of Previous Rejections**

The Office Action mailed September 22, 2009 acknowledges that the "[p]revious rejections of claims 9, 10, 12, 13, 15, 16 and 22-31 under 35 U.S.C. 103 by the combination of U.S. Patent No. 6,398,883 to Forrest et al. and WO 93/10935 to Thomas et al. have been withdrawn in view of applicants arguments and subsequent interview between Applicant's representative and Examiner." (O.A. (Sept. 22, 2009), ¶ 2.)

Applicants respectfully note that prior to the Office Action mailed September 22, 2009, the previous Office Action mailed December 12, 2008 no longer relied upon the combination of Forrest et al. and Thomas et al., but instead asserted rejections under 35 U.S.C. 103(a) based solely on the Forrest et al. reference. In fact, the Office Action mailed December 12, 2008 states “[t]he reference to Thomas has been withdrawn from this office action.” (O.A. (Dec. 12, 2008), page 9.) Applicants respectfully submit that the Status of Previous Rejections section in the Office Action mailed September 22, 2009 includes the withdrawal of the previous rejections of the pending claims based solely on the Forrest et al. In fact, the Response to Arguments section specifically states the “Forrest et al. reference has been withdrawn from the instant office action.” (O.A. (Sept. 22, 2009), page 11.) As referenced in the Status of Previous Rejections section, the Forrest et al. reference was withdrawn based upon Applicants’ Amendment filed May 11, 2009, subsequent August 4, 2009 interview and Supplemental Amendment filed September 3, 2009.

As indicated in the Telephonic Interview Summary section of the Supplemental Amendment filed September 3, 2009, the Forrest et al. reference was discussed in an August 4, 2009 telephonic interview along with proposed amendments to independent claims 10, 11, 22 and 23. Also, agreement was reached that the presently claimed invention overcame the pending rejections based upon the Forrest et al. reference. Particularly, the Forrest et al. reference fails to teach, disclose or suggest at least (i) friction stir welding regions of two metal work-pieces prior to the two metal work-pieces being fusion welded, (ii) performing friction stir welding on the surface of each work-piece that is to be aligned and abutted with each other, and (iii) that regions

of the work-pieces that melt during the fusion welding process are at least partially encompassed within the friction stir welded regions of the two metal work-pieces.

Accordingly, Applicants respectfully submit that the Status of Previous Rejections section of the Office Action mailed September 22, 2009 not only was applicable to the previous rejections of the pending claims based upon the combination of the Forrest et al. and Thomas et al. references, but also the Forrest et al. reference in combination with other references as presented in previous Office Actions, as well as the Forrest et al. reference alone as presented in the most recent previous Office Action mailed December 12, 2008.

**Claim Rejections-35 U.S.C. § 103(a)**

The September 22, 2009 Office Action rejected claims 9, 10, 12, 13, 15, 16 and 22-31 under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) (Applicant's Specification, page 1, lines 1-21) in view of U.S. Patent No. 6,726,085 to Litwinski et al. and U.S. Patent No. 6,659,330 to Ezumi et al. Applicants respectfully traverse these rejections as a *prima facie* case of obviousness of Applicants' claimed invention has not been established.

With all due respect, rejections to the pending claims concerning Litwinski have long since been raised by the Examiner, addressed by Applicants, and overcome. Particularly, rejections concerning Litwinski were raised in the Office Action mailed April 11, 2006 and reiterated in the Office Action mailed September 20, 2006. In the Amendment filed July 11, 2006, Applicants amended independent claims 1 and 10 and added new claim 22. Further, during a November 30, 2006 telephonic interview, a proposed amendment to claim 22 was discussed and indicated to have overcome the rejection with respect to Litwinski. Still further,

Applicants filed a Request for Continued Examination with a Preliminary Amendment on December 26, 2006, which further amended independent claims 1, 9, 10 and 22. Currently pending claims 9, 10 and 22 essentially retain the amendments that were previously made, as well as the amendments made thereafter, and independent claim 1 has been cancelled. In the subsequent Office Action mailed January 31, 2007, the Litwinski reference was no longer asserted; but instead, the Forrest et al. reference, which has now been overcome, was asserted as the primary reference. Thus, Applicants respectfully request withdrawal of the rejections based upon the Litwinski reference, as it was already raised, addressed and overcome by Applicants three years ago.

Notwithstanding the foregoing, a *prima facie* case of obviousness has not been established as the asserted AAPA in combination with Litwinski does not teach or suggest all of the features included in independent claims 9, 10, 22 and 23. As previously presented on numerous occasions, independent claims 9, 10, 22 and 23 of the present application require a preparatory grain-refining treatment by friction stir welding (FSW) **prior to** a fusion welding process, the preparatory treatment having been effected on the surface of *each* work-piece to be fusion welded to the other. As admitted in the September 22, 2009 Office Action, the asserted AAPA fails to teach friction stir welding a region of each work-piece that extends only part way into the work-piece, and also preparing the friction stir welded regions of at least each of the work-pieces **prior to** fusion welding said work-pieces together such that a fusion welded region of the work-pieces that melts during the fusion welding process is at least partially encompassed within the friction stir welded regions of the work-pieces. Instead, the Office Action relies upon Litwinski for these claim limitations. Litwinski, however, is no more relevant than Forrest.

Litwinski describes an apparatus for performing FSW on a work-piece (see paragraph 0007). The apparatus includes a die (16) that is dimensioned to receive a work-piece, that work-piece being urged through the die in such a way that a pin (28), housed in the die, stirs at least part of the work-piece. This refines the work-piece's grain structure (see paragraph 0066). While Litwinski discloses that a preform (26) (produced by the FSW extrusion technique taught by Litwinski) "can then be machined, using known machining methods, into a structural member that can be connected to other structural members using fasteners or welding techniques to form a structural assembly, such as the frame of an aerospace vehicle" (at column 15, lines 54 to 58), there is no suggestion or teaching that two work-pieces should be joined by performing a FSW treatment on *each* work-piece and then subsequently joining the two work-pieces by means of a fusion welding process. Also, Litwinski provides no suggestion that the region of fine grain structure extends into the work-piece to a depth such that regions of the work-pieces that liquefy or melt during the subsequent fusion welding process are at least partially encompassed within the friction stir welded regions of the work-pieces.

The Office Action cites Litwinski (e.g., the disclosure at column 15, lines 15-24) suggesting friction stir-welding a work-piece prior to welding. Applicant notes, however, as recognized in the Office Action that this passage of Litwinski et. al. '085 describes extruding and friction stir-welding substantially the entire work-piece, which may then be joined to other structural members with fasteners or welding to form an assembly. This approach would necessarily result in alteration of the grain structure in the entire work-piece.

In contrast, friction stir-welding is used in the claimed process to refine the grain structure of only the portions of two separate work-pieces that will be directly welded together.

A grain geometry that provides the mechanical properties desirable for structural aircraft components is different from the grain geometry desirable for fusion welding two work-pieces together. Preparation of the work-pieces only in the region of the work-pieces to be joined as in the claimed invention enables large billets of material having the desired mechanical properties to be joined together (for producing long spars, for example) while minimally affecting the bulk structural properties of the alloy. See, e.g., Specification, p. 6, ll. 2-25; p. 9, l. 22 through p. 10, l. 2. Litwinski nowhere teaches, discloses or suggests localized preparation of portions of two work-pieces as in the claimed invention. Moreover, to the extent friction-stir welding the bulk material, as in Litwinski, would necessarily alter the desired grain structure throughout the resulting structural component, it teaches away from the claimed invention. Consequently, Litwinski, individually or in combination, with the asserted AAPA cannot be considered to render the claimed invention obvious.

The Ezumi reference cited in the September 22, 2009 Office Action does not cure the foregoing deficiencies. Instead, Ezumi merely discloses FSW being applied to two protrusions and a filling material **after** the protrusions have been pressed to fix the filling material between them. In a similar fashion as Forrest, Ezumi discloses performing FSW as a final step, after an initial joining step has already been performed. Ezumi does not disclose the use of FSW **prior** to fusion welding two work-pieces together. Moreover, Ezumi is even further removed from the presently claimed invention as it: (i) does not disclose any aerospace application, and (ii) uses the FSW process as a way of bonding the filling material to the protrusions by FSW along a joint line and causing the material to heat, soften and plasticize the joint, thereby performing the solid-

phase bonding. In other words, the FSW in Ezumi is not considered a process that could benefit by being applied to work-pieces in isolation (e.g., before the work-pieces are joined together).

Moreover, the previously cited Forrest reference does not cure the foregoing deficiencies. As previously discussed, both Litwinski and Forrest disclose little more than aerospace-related applications of FSW, which is already acknowledged in the specification. (See e.g., Specification, page 4, line 30 to page 5, line 4.) Neither Litwinski nor Forrest, however, disclose two work-pieces being treated with FSW **prior** to the work-pieces being fusion welded together. There is no teaching, disclosure or suggestion in either reference that FSW could be used on two joint surfaces to improve the **subsequent** joint. There is also no teaching, disclosure or suggestion that a fusion welded region of the work-pieces that melts during the fusion welding process is at least partially encompassed within the friction stir welded regions of the work-pieces.

Accordingly, since the cited references, including Litwinski and Ezumi, and the previously cited Forrest reference, whether considered individually or in combination, fail to teach, disclose or suggest all the features of the presently claimed invention, including at least friction stir welding a region of each work-piece that extends only part way into the work-piece, and also preparing the friction stir welded regions of at least each of the work-pieces **prior** to fusion welding said work-pieces together such that a fusion welded region of the work-pieces that liquefies or melts during the fusion welding process is at least partially encompassed within the friction stir welded regions of the work-pieces, a *prima facie* case of obviousness has not been established. Consequently, Applicants respectfully request reconsideration and withdrawal of the foregoing rejection.



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In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



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